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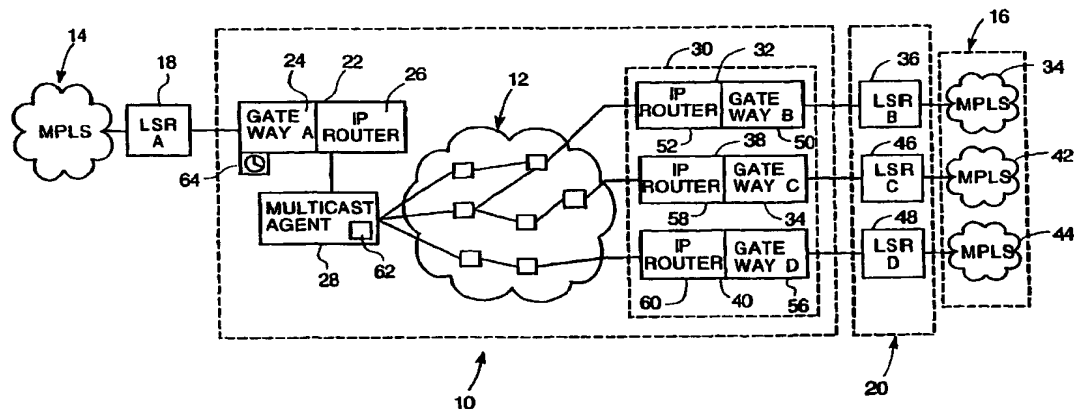
— with international search report

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DISTRIBUTED LABEL SWITCHING ROUTER



(57) Abstract: A distributed LSR sends data from a first edge LSR, across a non-MPLS network, to a second edge LSR, thereby enabling a non-MPLS network to interface transparently with MPLS networks. This enables a VPN to use a public network to communicate from one portion of the network to another remote portion. The distributed LSR includes an ingress gateway logically positioned between the first edge LSR and the non-MPLS network. This ingress gateway receives label requests from the first edge LSR. These label requests are multicast to several egress gateways. At least one egress gateway sends a message back indicating that it can transmit data to the destination. In response, the ingress gateway designates that egress gateway to be a designated gateway. The egress gateway then establishes a tunnel through non-MPLS network to the ingress gateway.

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DISTRIBUTED LABEL SWITCHING ROUTER

FIELD OF INVENTION

This application relates to data communication networks, and in particular, to interfaces between MPLS networks and non-MPLS networks.

5 BACKGROUND

A network typically includes a collection of routers interconnected with each other. From a data packet's point of view, each router is a stepping stone toward its destination. To traverse the network from its source to its destination, a data packet engages in a sequence of "hops" from one router to the next.

10 Each router in a network is a device having an input side with at least one input connected to an adjacent router and an output side with several outputs, each of which is connected to an adjacent router. The router receives a data packet through its input and forwards the data packet to an adjacent router through one of its several outputs. The function of a router is to decide, for each
15 data packet arriving at its input, which of the several adjacent routers it is to relay the data packet to. Typically, a router accomplishes this by examining a header associated with the data packet to determine that data packet's destination. Using a look-up table, the router then determines which of the adjacent routers on its output side is the appropriate router for the data packet's next hop toward its
20 destination.

In order for a network to operate correctly, it is preferable that each router understand the information contained in the header associated with the data packet. This can create difficulties when, in order to reach its destination, the data packet traverses a network in which the routers are unable to recognize the
25 information contained within the header. This can occur when a router understands only a protocol other than that used to generate the header.

An MPLS ("multi-protocol label switching") network is based on the

recognition that information for relaying the data packet on its next hop need be understood only by two adjacent routers. In an MPLS network, each data packet is encapsulated by a label. Each router on an MPLS network operates by receiving the labeled data packet through its input side and determining, on the basis of information in the label, which router to relay the data packet to on its output side. Then, the router switches the label with a new label containing information that can be understood by the next router to receive the data packet. The label is thus of only local significance and is typically switched to a new label before every hop. Because a router on an MPLS network switches the label associated with the data packet, such a router is referred to as a "label-switching router" or "LSR."

It is apparent that the LSRs in an MPLS network need not recognize or understand the header of the data packet. The LSRs need only recognize labels. As a result, a data packet can readily traverse networks in which the routers are incapable of recognizing its header. All that is necessary is that each router in the network be a label switching router. It is for this reason that an MPLS network is a "multi-protocol" network.

SUMMARY

A distributed LSR according to the invention includes an ingress gateway logically positioned between a first edge LSR and the non-MPLS network. This ingress gateway receives a label request from the first edge LSR and instructs a multicast agent to relay this label request from the ingress gateway, across a non-MPLS network, to a plurality of egress gateways. The multicast agent also relays responses, if any, from the egress gateways, across the non-MPLS network, and back to the ingress gateway. Preferably, the multicast agent maintains at least one table specifying the egress gateways corresponding to a particular virtual private network.

Among the egress gateways is a designated gateway, which is typically selected from the egress gateways on the basis of whether a connection can be made between that egress gateway and an address specified in the label request message. The designated gateway is logically positioned between the second
5 edge LSR and the non-MPLS network.

The non-MPLS network can be a conventional packet switching network such as an IP network. In this case, the distributed LSR preferably includes an ingress IP router logically positioned between the ingress gateway and the multicast agent and an egress IP router logically positioned between the egress
10 gateway and the IP network.

To avoid having the ingress gateway wait interminably for a response from the egress gateways, the ingress gateway preferably includes a timer for detecting the lapse of a predetermined interval following transmission of the label request.

15 Preferably, the distributed LSR also includes confirmation means for sending a confirmation message to the egress gateways. This confirmation message specifies the designated gateway for the communication path. The confirmation message can be sent to all egress gateways responding to the label request message or only to those egress gateways that are not to become the
20 designated gateway.

For some VPN topologies, the destination requested in a label request message may be accessible by more than output edge router. Under these circumstances, there exists the possibility that more than one egress gateway will send a label mapping message back to the ingress gateway. To address this
25 possibility, the distributed LSR preferably includes selection means for selecting a designated gateway from a plurality of responses from the plurality of egress gateways. This selection can be made on a first-come-first-served basis, in which

case the designated gateway is the first egress gateway to respond, or by determining which of the responding egress gateways is the optimal egress gateway.

According to an additional aspect of the invention, the distributed LSR
5 receives a label request from a first edge LSR and multicasts that label request across the non-MPLS network to a plurality of egress gateways. At least one egress gateway then generates a response indicating that there exists a communication path between a second edge LSR and that responding egress gateway. Upon receipt of this response, the ingress gateway then designates the
10 responding egress gateway to be the designated gateway for transmission of data to the second edge LSR.

Where the first and second LSRs are associated with VPNs, it is advantageous to maintain a secure link across the non-MPLS network. For this reason, it is preferable that a tunnel be established across the non-MPLS network
15 between the ingress gateway and the designated gateway.

Preferably, the ingress gateway waits only a predetermined interval for responses before assuming that communication is not currently available. This ensures that the ingress gateway will not wait an interminable period for a response.

20 Following designation of a designated gateway, the ingress gateway preferably sends a confirmation message to the egress gateways. This confirmation message can be sent to all egress gateways or all egress gateways other than the designated gateway.

The invention thus provides a method and system for interfacing a non-
25 MPLS network with an MPLS network in a gradual and controlled manner without the need to replace each router in the non-MPLS network with an LSR. This is accomplished by having the entire non-MPLS network appear to the

MPLS network as a single, virtual, LSR. This is a significant advantage because the conversion of a potentially large number of routers in a non-MPLS network requires a period during which the network will be non-operational.

5 The single, virtual LSR of the invention is a distributed LSR because it performs the functions of a conventional LSR through the cooperation of several routers. Like a conventional LSR, the distributed LSR accepts a labeled data packet at its input port, switches the label on the data packet, and sends the data packet, with its new label, out a selected output port. However, unlike a conventional LSR, the distributed LSR of the invention does not rely on a label
10 information base to accomplish label switching. Instead, an ingress gateway in the distributed LSR instructs a multicasting agent to multicast a label request, across a non-MPLS network, to each of a plurality of egress gateways. If a route to a destination from a particular egress gateway is available, that egress gateway then sends a label mapping message back to the ingress gateway.

15 On the basis of the label mapping messages received from the egress routers, the ingress router selects one of the egress routers to complete the LSP (label-switching protocol). The distributed LSR then creates a tunnel within the non-MPLS network for communication between the ingress router and the egress router.

20 Other features and advantages of the invention will be apparent upon examination of the following detailed description and the accompanying figures in which:

DESCRIPTION OF THE FIGURES

FIG. 1 is a schematic diagram of the architecture of a distributed LSR according to the invention;

FIG. 2 is the distributed LSR of FIG. 1 but with two output edge LSRs communicating with the same output MPLS network; and

FIG. 3 is a flow chart of the process carried out by the distributed LSR of FIG. 1.

DETAILED DESCRIPTION

Referring to FIG. 1, a distributed label-switching router (LSR) 10 interfaces a non-MPLS network 12 with both an input MPLS network 14 and with a plurality of output MPLS networks 16. In the illustrated embodiment, the input MPLS network 14 and the plurality of output MPLS networks 16 form two parts of a virtual private network (VPN). In the context of this description, the non-MPLS network is an IP network 12, however other packet switching networks can be substituted for the IP network 12.

The IP network 12 is a public network that links these two parts of the VPN. To maintain security of the VPN, data preferably travels along a secure path when traversing the IP network 12. This is achieved by establishing a tunnel across the IP network 12. The distributed LSR 10 dynamically establishes such tunnels on an as-needed basis.

The input MPLS network 14 connects to the distributed LSR 10 through an input edge LSR 18. Similarly, the output MPLS networks 16 connect to the distributed LSR 10 through a plurality of output edge LSRs 20. Both the input edge LSR 18 and the output edge LSRs 20 are MPLS egress routers running LDP and operating in downstream on-demand mode with conservative label retention. Both the input edge LSR 18 and the output edge LSRs 20 perform the ingress and egress functions specified by the conventional MPLS architecture. Preferably, the

distributed LSR 10 uses MPLS signaling rather than conventional frame relay signaling to minimize the extent of the routing information exchanged between ingress router and the egress router. This results in a simpler and more scalable network. Each edge LSR shown in FIG. 1 communicates with the distributed LSR 10 through a frame-relay interface. However, the edge LSRs can also communication with the distributed LSR through other WAN interfaces.

The distributed LSR 10 interfaces with the input MPLS network 14 through an ingress router 22 connected to the input edge LSR 18. An ingress gateway 24 logically positioned between the input edge LSR 18 and a first IP router 26 provides the interface between the ingress router 22 and the input edge LSR 18. Through a multicast agent 28, the ingress router 22 interfaces with the IP network 12 that provides communication paths between the ingress router 22 and a plurality of egress routers 30.

For purposes of illustration, FIG. 1 shows a first egress router 32 in communication with a first output network 34 through a first output edge LSR 36. Similarly, FIG. 1 shows second and third egress routers 38, 40 in communication with second and third output networks 42, 44 through second and third output edge LSRs 46, 48 respectively. However, the plurality of egress routers 30 can include any number of constituent egress routers.

The structures of the egress routers 32, 38, 40 mirror that of the ingress router 22. For example, the first egress router 32 includes a first egress gateway 50 logically positioned between a second IP router 52 and the first output edge LSR 36. The first egress gateway 50 interfaces with the first output edge LSR 36 while the second IP router 52 interfaces with the IP Network 12. Similarly, the second and third egress routers 38, 40 include second and third egress gateways 54, 56 logically positioned between the third and fourth IP routers 58, 60 and the second and third output edge LSRs 46, 48 respectively. The second and third egress routers 38, 40 interface with the IP network 12 through the third and fourth

IP routers 58, 60 respectively and with the second and third output edge LSRs 46, 48 through the second and third egress gateways 54, 56 respectively.

In operation, the input edge LSR 18 and the ingress gateway 24 establish an LDP (label distribution protocol) session between each other using
5 conventional discovery and initialization procedures. This is equivalent to setting up an LDP session between two LSRs in conventional MPLS networking. Little or no routing information is exchanged between the ingress gateway 24 and the input edge LSR 18 during establishment of an LDP session. It is sufficient that
10 the input edge LSR 18 use the ingress gateway 24 as a default router or default next hop for addresses within the VPN. This implies that to resolve an address within the VPN, the input edge LSR 18 sends the ingress gateway 24 a label request message specifying a destination address.

In response to a label request message from the input edge LSR 18, the ingress gateway 24 communicates the label request message to the multicast
15 agent 28. For each VPN serviced by the distributed LSR 10, the multicast agent 28 maintains a router table 62 listing all egress routers associated with that VPN. As a result, changes to the topology of a particular VPN are easily implemented by adding and deleting egress routers from the appropriate router table 62.

The multicast agent 28 relays the label request to the all the egress routers
20 in its router table 62, which in the example of FIG. 1 includes the first, second, and third egress routers 32, 28, 40. The first, second, and third egress routers 32, 28, 40 then forward the label request to the first, second, and third output edge LSRs 36, 46, 48, each of which has established an LDP session with its corresponding egress gateway 50, 54, 56. Each of the output edge LSRs 36, 46,
25 48 includes a routing table listing all destinations accessible by that edge LSR.

Each of the first, second, and third output edge LSRs 36, 46, 48 determines, independently of the others, whether the destination address specified

in the label request message is within its respective routing table. If one of the output edge LSRs, for example the first output edge LSR 36, determines that the destination address is in its routing table, it sends a label mapping message back to the first egress gateway 50 to which it is connected. The first egress gateway
5 50 then forwards the label mapping message across the IP network 12 to the ingress gateway 24.

Upon receipt of a label mapping message, the ingress gateway 24 designates the responding egress gateway (in this case the first egress gateway 50) to be the designated gateway for the ensuing label switched path (LSP)
10 between the ingress gateway 24 and the responding output edge LSR 36. The first egress gateway 50, which is now the designated gateway, then establishes a tunnel across the IP network 12 between itself and the ingress gateway 24. This establishes an LSP path between the input edge LSR 18 and the first output edge LSR 36. The resulting LSP path includes three distinct path segments: (1) a
15 segment from the input edge LSR 18 to the ingress gateway 24, which is labeled in normal MPLS fashion; (2) a segment from the ingress gateway 24 to the first egress gateway 50, in which traffic is carried in an IP tunnel; and (3) a segment from the first egress gateway 50 to the first output edge LSR 36, which is labeled in normal MPLS fashion.

20 In a preferred embodiment, upon receipt of a label mapping message from any one of the egress gateways 50, 54, 56, the ingress gateway 24 instructs the multicast agent 28 to relay to all the egress gateways 50, 54, 56 a confirmation message containing the identity of the designated gateway. Each egress gateway 50, 54, 56 checks the identity of the designated gateway specified in this
25 confirmation message. If the identity of the designated gateway differs from that of the egress gateway, the egress gateway releases the LSP at its interface with its corresponding output edge LSR. If the output edge LSR connected to the egress gateway has already responded, this is achieved by sending a label abort notification message to the output edge LSR.

Alternatively, the ingress gateway 24 can instruct the multicast agent 28 to send a message only to those egress gateways that are not the designated gateway. This message instructs those egress gateways to abort any LSP established in response to the original label request message.

5 Preferably, the ingress gateway 24 includes a timer 64 that begins counting down upon transmission of the label request message. If, at the expiration of a predetermined interval the ingress gateway 24 fails to receive any response from the egress gateways 50, 54, 56, the ingress gateway 24 sets the address of the designated gateway to be a null address and sends a confirmation
10 message, as described above.

For some VPN topologies, as shown in FIG. 2, a particular destination address may be in two different router tables associated with two different output edge routers. Under these circumstances, the ingress gateway 24 may receive two label mapping messages. Although a VPN topology of the type shown in FIG. 2
15 is both uncommon and undesirable, it is preferable that the ingress gateway 24 be provided with a mechanism for designating an egress gateway for the LDP session from a plurality of responding egress gateways. This choice can be made randomly, for example on a first-come-first-served basis. Alternatively, the choice can be made on the basis of which egress gateway is perceived to be
20 optimal. For example, if one of the two responding egress gateways is notoriously busy, the designated egress gateway might be the less busy egress gateway.

Referring now to FIG. 3, the process of establishing a communication path between the input edge LSR and the output edge LSR begins with the
25 receipt 66, by the ingress gateway, of a label request message from the input edge LSR. The ingress gateway then instructs 68 the multicast agent to multicast the label request message across the IP network to the egress gateways. Concurrently, the input edge LSR sets 70 a timer and waits 72 for a response.

Periodically, the ingress gateway checks 74 the timer to see if a waiting interval has elapsed. If the waiting interval has not yet elapsed, the ingress gateway continues 72 to wait for a response. If the waiting interval has elapsed and no response has been received from an egress gateway, the ingress gateway
5 sets 76 the designated gateway to be a null gateway. A confirmation message specifying this designated gateway is then multicast 80 to the egress gateways.

Meanwhile, each egress gateway receives 82 the multicast label request message and establishes 84 an LDP session with output edge router to determine whether the destination specified in that message is accessible to it. If it is not, the
10 egress gateway does nothing 86. If it is, then the egress gateway sends 88 a label mapping message back to the ingress gateway.

Upon receipt 90 of the label mapping message, the ingress gateway sets 92 the egress gateway that sent the label mapping message to be the designated gateway. A confirmation message specifying the designated gateway is then
15 multicast 80 to the egress gateways.

In those rare cases in which the ingress gateway receives a label mapping message from more than one egress gateway, the ingress gateway selects a designated gateway, either on a first-come-first-served basis or by selecting the optimal egress gateway to be the designated gateway.

20 Each egress gateway then receives 94 the confirmation message and determines 96 whether it is to become the designated gateway. If the egress gateway determines that it is to become the designated gateway, it proceeds to establish 98 a tunnel across the IP network between itself and the ingress gateway. If the egress gateway determines that it is not to become the designated
25 gateway, it proceeds to tear down 100 the LDP session, if any, established between itself and an output edge router.

It is apparent from the foregoing that the when ingress and egress

gateways cooperate with a multicasting agent in the manner set forth above, encapsulates a non-MPLS network so that, from the point of view of an edge LSR, it appears to be no more than another LSR. This is achieved without the burden and expense of having to convert each router within the non-MPLS

5 network into an LSR. In addition, the distributed LSR dynamically establishes tunnels through the non-MPLS network on an as-needed basis, thereby simplifying the task of adding and removing customers from a VPN.

It is to be understood that while the foregoing detailed description has described a selected embodiment of the invention, it is intended to illustrate and

10 not to limit the scope of the invention. The invention, together with other aspects, advantages, and modifications thereof, are limited only by the scope of the appended claims.

What is claimed is:

CLAIMS

1. A distributed label-switching-router for sending a data packet from a first edge label-switching-router, across a non-multi-protocol-label-switching network, to a second edge label-switching-router, said distributed label-switching-router comprising:
 - an ingress gateway logically positioned between said first edge label-switching-router and said non-multi-protocol-label-switching network, said ingress gateway receiving a label request from said first edge label-switching-router;
 - a multicast agent in communication with said ingress gateway and said non-multi-protocol-label-switching network for relaying said label request from said ingress gateway, across said non-multi-protocol-label-switching network, to a plurality of egress gateways, and for relaying at least one response from said plurality of egress gateways, across said non-multi-protocol-label-switching network, to said ingress gateway; and
 - a designated gateway from said plurality of egress gateways, said designated gateway being logically positioned between said second edge label-switching-router and said non-multi-protocol-label-switching network.
2. The distributed label-switching-router of claim 1 wherein said non-multi-protocol-label-switching network is an internet protocol network.
3. The distributed label-switching-router of claim 2 further comprising an ingress internet protocol router logically positioned between said ingress gateway and said multicast agent.
4. The distributed label-switching-router of claim 2 further comprising an

egress internet protocol router logically positioned between said egress gateway and said internet protocol network.

- 5 5. The distributed label-switching-router of claim 1 wherein said ingress gateway further comprises a timer for detecting the lapse of a predetermined interval following transmission of said label request.
6. The distributed label-switching-router of claim 1 wherein said multicast agent further comprises a table providing information indicative of which egress gateways from said plurality of egress gateways are associated with a virtual private network.
- 10 7. The distributed label-switching-router of claim 1 further comprising confirmation means for sending a confirmation message designating said designated gateway from said plurality of egress gateways.
8. The distributed label-switching-router of claim 7 wherein said confirmation means comprises means for sending said confirmation message to all egress gateways responding to said label request message.
- 15 9. The distributed label-switching-router of claim 7 wherein said confirmation means comprises means for sending said confirmation message to those egress gateways, other than said designated gateway, responding to said label request message.
- 20 10. The distributed label-switching-router of claim 1 further comprising selection means for selecting a designated gateway on the basis of said at least one response from said plurality of egress gateways.
11. The distributed label-switching-router of claim 1 further comprising selection means for selecting a designated gateway from a plurality of responses from said plurality of egress gateways.
- 25

12. The distributed label-switching-router of claim 1 wherein said designated gateway further comprises means for establishing a tunnel across said non-multi-protocol-label-switching network.
13. A method for sending a data packet from a first edge label-switching-router, across a non-multi-protocol-label-switching network, to a second edge label-switching-router, said method comprising:
- 5 receiving a label request from said first edge label-switching-router;
- 10 multicasting said label request, across said non-multi-protocol-label-switching network, to a plurality of egress gateways;
- receiving at least one response from at least one egress gateway from said plurality of egress gateways, said at least one response indicative of a communication path between said second edge label-switching-router and said at least one egress gateway; and
- 15 designating said at least one egress gateway to be a designated gateway for communication between said first edge label-switching-router and said second edge label-switching-router.
14. The method of claim 13 further comprising establishing a tunnel across said non-multi-protocol-label-switching network.
- 20 15. The method of claim 13 further comprising detecting a lapse of a predetermined interval following said multicasting of said label request.
16. The method of claim 13 further comprising determining which egress gateways from said plurality of egress gateways are associated with a virtual private network.
- 25

17. The method of claim 13 further comprising confirming said designated gateway by sending a confirmation message to said plurality of egress gateways, said confirmation message being indicative of said designated gateway from said plurality of egress gateways.
- 5 18. The method of claim 17 wherein confirming said designated gateway comprises sending said confirmation message to all egress gateways responding to said label request message.
19. The method of claim 17 wherein confirming said designated gateway comprises sending said confirmation message to those egress gateways,
10 other than said designated gateway, responding to said label request message.
20. The method of claim 13 further comprising selecting a designated router on the basis of said at least one response from said plurality of egress gateways.
- 15 21. The method of claim 13 further comprising selecting a designated router from a plurality of responses from said plurality of egress gateways.

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FIG. 1

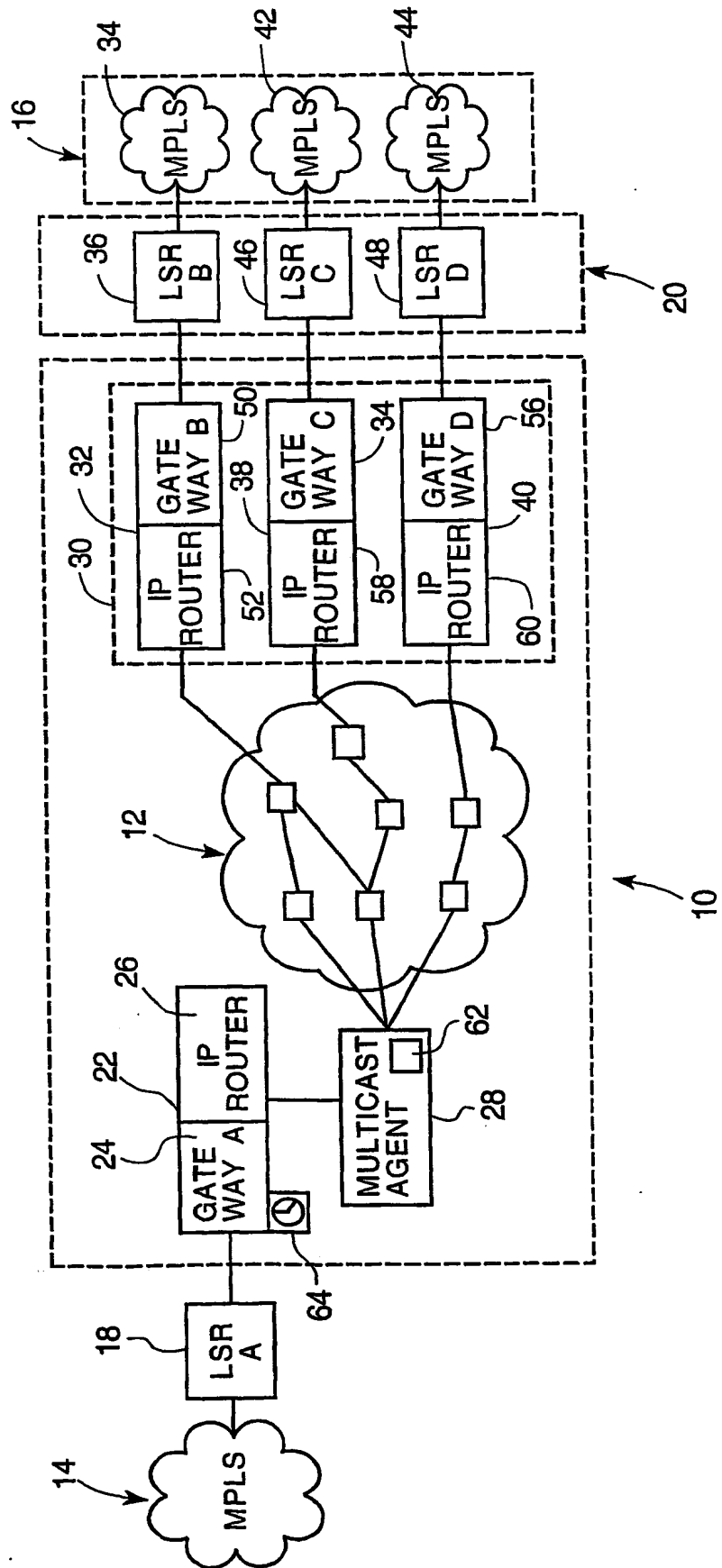
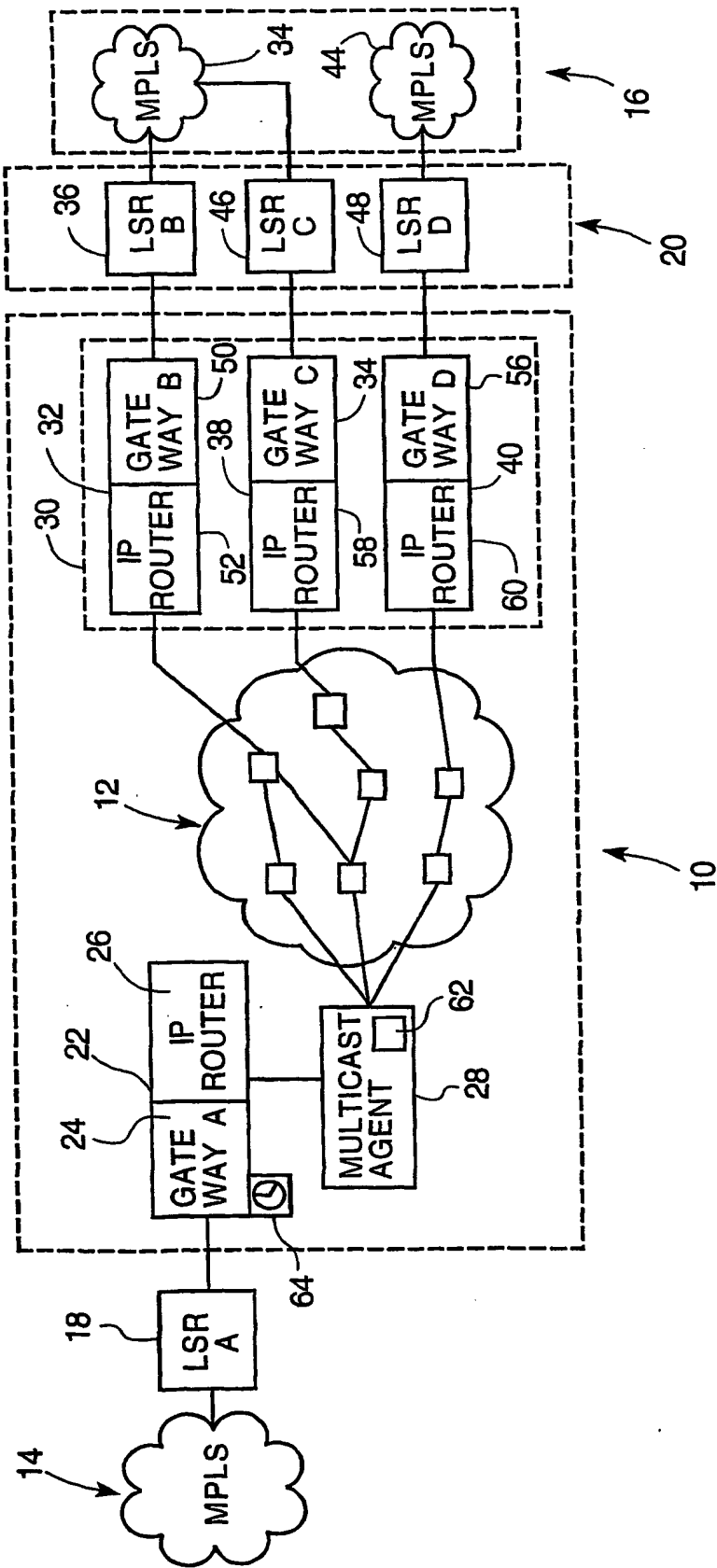
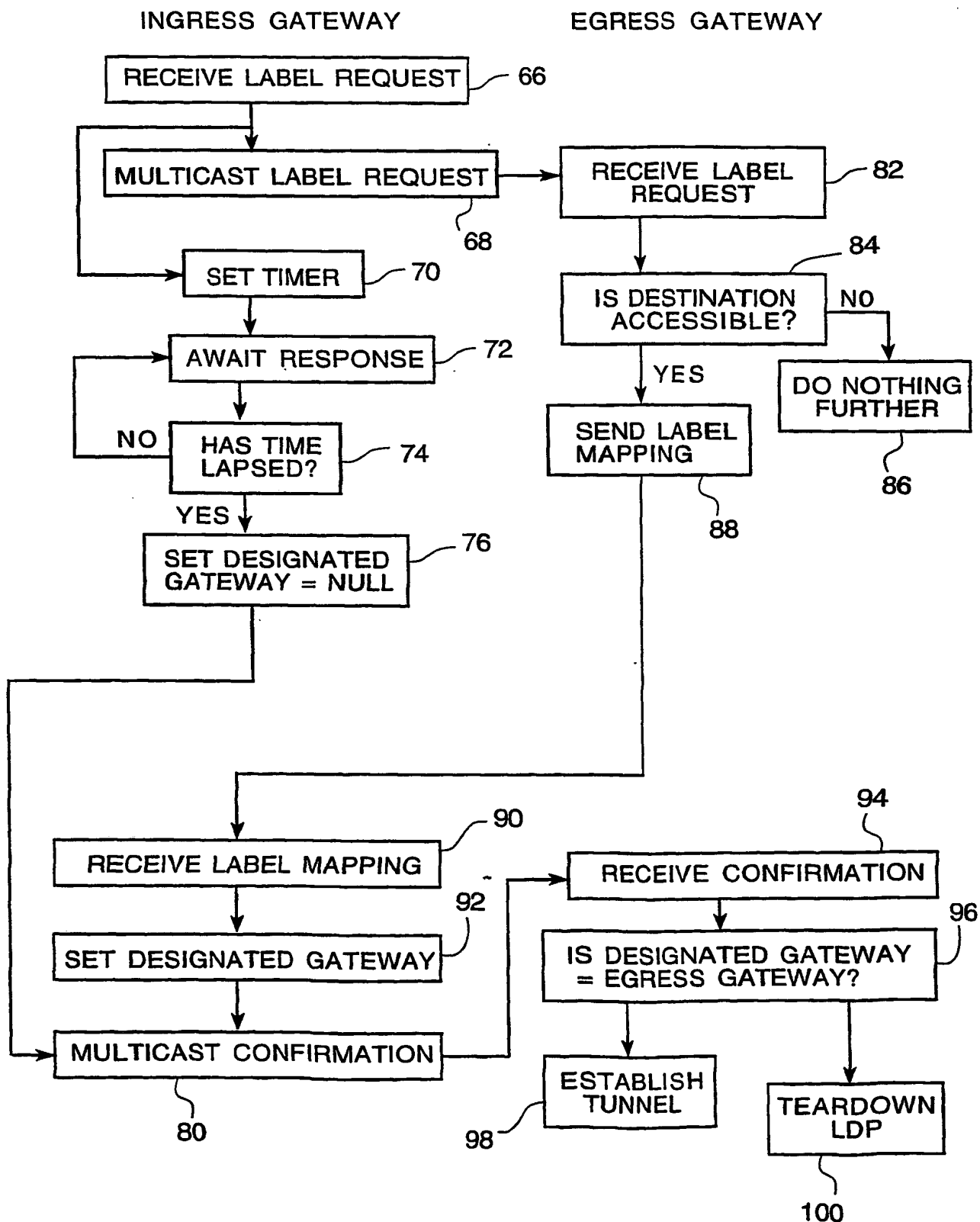


FIG. 2



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FIG. 3



PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 11871-004W01	FOR FURTHER ACTION <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. PCT/US 00/ 16361	International filing date (day/month/year) 14/06/2000	(Earliest) Priority Date (day/month/year)
Applicant NORTEL NETWORKS LTD.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/16361

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04L12/46

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	LE FAUCHEUR F: "IETF Multiprotocol Label Switching (MPLS) Architecture" IEEE INTERNATIONAL CONFERENCE ON ATM, XX, XX, 22 June 1998 (1998-06-22), pages 6-15, XP002115225 page 7, left-hand column, paragraph 8 -page 9, right-hand column, paragraph 4	1-21
A	ARMITAGE G: "MPLS: The Magic Behind the Myths" IEEE COMMUNICATIONS MAGAZINE, 31 January 2000 (2000-01-31), pages 124-131, XP002162773 abstract page 128, right-hand column, paragraph 3 -page 131, left-hand column, paragraph 3 -/-	1-21

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

13 March 2001

Date of mailing of the international search report

26/03/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fac. (+31-70) 340-3016

Authorized officer

Blanco Cardona, P

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/16361

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JAMOUSSE B: "Constraint-Based LSP Setup using LDP" INTERNET DRAFT. MPLS WORKING GROUP, 28 February 1999 (1999-02-28), pages 1-29, XP002150264 abstract page 4, paragraph 1 -page 7	1-21
A	EP 0 952 755 A (NIPPON ELECTRIC CO) 27 October 1999 (1999-10-27) column 8, paragraph 41 -column 12, paragraph 66	1,13,16

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

International Application No

PCT/US 00/16361

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0952755 A	27-10-1999	JP 11284664 A	15-10-1999



REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

for receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) 11871-004WO1

Box No. I. TITLE OF INVENTION
DISTRIBUTED LABEL SWITCHING ROUTER

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NORTEL NETWORKS LTD.
World Trade Center, Montreal
380 St. Antoine Street West, 8th Floor
Montreal, Quebec H2Y 3Y4
Canada

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:
CA

State (that is, country) of residence:
CA

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

MATTSON, Geoffrey A.
2 Rue de Revely
Antibes 99 06600
France

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
US

State (that is, country) of residence:
FR

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent ☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

LICHAUCO, Faustino A., MALONEY, Denis G. and FRENCH, Timothy A.
Fish & Richardson P.C.
225 Franklin Street
Boston, Massachusetts 02110-2804
United States of America

Telephone No.
(617) 542-5070

Facsimile No.
(617) 542-8906

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box I FURTHER APPLICANTS AND/OR (OTHER) INVENTOR(S)	
<i>If none of the following sub-boxes is used, this sheet is not to be included in the request.</i>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) ANDERSSON, Loa Skovelagen 17 Jlvsko 12533 Sweden	This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality: SE	State (that is, country) of residence: SE
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	This person is: <input type="checkbox"/> applicant only <input type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality:	State (that is, country) of residence:
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	This person is: <input type="checkbox"/> applicant only <input type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality:	State (that is, country) of residence:
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	This person is: <input type="checkbox"/> applicant only <input type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality:	State (that is, country) of residence:
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	This person is: <input type="checkbox"/> applicant only <input type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality:	State (that is, country) of residence:
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input type="checkbox"/> Further applicants and/or (further) inventors are indicated on another continuation sheet.	

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☐ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|---|
| <input type="checkbox"/> AE United Arab Emirates | <input type="checkbox"/> LR Liberia |
| <input type="checkbox"/> AL Albania | <input type="checkbox"/> LS Lesotho |
| <input type="checkbox"/> AM Armenia | <input type="checkbox"/> LT Lithuania |
| <input type="checkbox"/> AT Austria | <input type="checkbox"/> LU Luxembourg |
| <input type="checkbox"/> AU Australia | <input type="checkbox"/> LV Latvia |
| <input type="checkbox"/> AZ Azerbaijan | <input type="checkbox"/> MA Morocco |
| <input type="checkbox"/> BA Bosnia and Herzegovina | <input type="checkbox"/> MD Republic of Moldova |
| <input type="checkbox"/> BB Barbados | <input type="checkbox"/> MG Madagascar |
| <input type="checkbox"/> BG Bulgaria | <input type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input type="checkbox"/> BR Brazil | |
| <input type="checkbox"/> BY Belarus | <input type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> CA Canada | <input type="checkbox"/> MW Malawi |
| <input type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input type="checkbox"/> MX Mexico |
| <input type="checkbox"/> CN China | <input type="checkbox"/> NO Norway |
| <input type="checkbox"/> CR Costa Rica | <input type="checkbox"/> NZ New Zealand |
| <input type="checkbox"/> CU Cuba | <input type="checkbox"/> PL Poland |
| <input type="checkbox"/> CZ Czech Republic | <input type="checkbox"/> PT Portugal |
| <input type="checkbox"/> DE Germany | <input type="checkbox"/> RO Romania |
| <input type="checkbox"/> DK Denmark | <input type="checkbox"/> RU Russian Federation |
| <input type="checkbox"/> DM Dominica | <input type="checkbox"/> SD Sudan |
| <input type="checkbox"/> EE Estonia | <input type="checkbox"/> SE Sweden |
| <input type="checkbox"/> ES Spain | <input type="checkbox"/> SG Singapore |
| <input type="checkbox"/> FI Finland | <input type="checkbox"/> SI Slovenia |
| <input type="checkbox"/> GB United Kingdom | <input type="checkbox"/> SK Slovakia |
| <input type="checkbox"/> GD Grenada | <input type="checkbox"/> SL Sierra Leone |
| <input type="checkbox"/> GE Georgia | <input type="checkbox"/> TJ Tajikistan |
| <input type="checkbox"/> GH Ghana | <input type="checkbox"/> TM Turkmenistan |
| <input type="checkbox"/> GM Gambia | <input type="checkbox"/> TR Turkey |
| <input type="checkbox"/> HR Croatia | <input type="checkbox"/> TT Trinidad and Tobago |
| <input type="checkbox"/> HU Hungary | <input type="checkbox"/> TZ United Republic of Tanzania |
| <input type="checkbox"/> ID Indonesia | <input type="checkbox"/> UA Ukraine |
| <input type="checkbox"/> IL Israel | <input type="checkbox"/> UG Uganda |
| <input type="checkbox"/> IN India | <input checked="" type="checkbox"/> US United States of America |
| <input type="checkbox"/> IS Iceland | |
| <input type="checkbox"/> JP Japan | <input type="checkbox"/> UZ Uzbekistan |
| <input type="checkbox"/> KE Kenya | <input type="checkbox"/> VN Viet Nam |
| <input type="checkbox"/> KG Kyrgyzstan | <input type="checkbox"/> YU Yugoslavia |
| <input type="checkbox"/> KP Democratic People's Republic of Korea | <input type="checkbox"/> ZA South Africa |
| | <input type="checkbox"/> ZW Zimbabwe |
| <input type="checkbox"/> KR Republic of Korea | |
| <input type="checkbox"/> KZ Kazakhstan | |
| <input type="checkbox"/> LC Saint Lucia | |
| <input type="checkbox"/> LK Sri Lanka | |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☐
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): _____ <small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): Date (day/month/year) Number Country (or regional Office)		
ISA/ EP				
Box No. VIII CHECK LIST: LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 12 claims : 4 abstract : 1 drawings : 3 sequence listing part of description : 0 Total number of sheets : 24		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): check, postcard		
Figure of the drawings which should accompany the abstract: 1		Language of filing of the international application: English		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request). <div style="display: flex; align-items: center;"> <div> Faustino A. Lichauco </div> </div>				

For receiving Office use only		2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:		
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): ISA/	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

PCT**FEE CALCULATION SHEET****Annex to the Request**

For receiving Office use only

International application No. _____

Applicant's or agent's
file reference**11871-004WO1**

Date stamp of the receiving Office. _____

Applicant

NORTEL NETWORKS LTD.**CALCULATION OF PRESCRIBED FEES**

1. TRANSMITTAL FEE

240.00 **T**

2. SEARCH FEE

990.00 **S**International search to be carried out by **EP***(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)*

3. INTERNATIONAL FEE

Basic FeeThe international application contains **24** sheets.

first 30 sheets

427.00 **b1****0** x **\$10.00**
remaining sheets additional amount**0.00** **b2**

Add amounts entered at b1 and b2 and enter total at B

427.00 **B****Designation Fees**The international application contains **3** designations.**3** x **92.00** =
number of designation fees amount of designation fee
payable (maximum 8)**276.00** **D**

Add amounts entered at B and D and enter total at I

703.00 **I***(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the*

4. FEE FOR PRIORITY DOCUMENT (if applicable)

P

5. TOTAL FEES PAYABLE

1,933.00

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL☐ The designation fees are not paid at this time.**MODE OF PAYMENT**☒ authorization to charge
deposit account (see below)☐ bank draft☐ coupons☒ cheque☐ cash☐ other (specify):☐ postal money order☐ revenue stamps**DEPOSIT ACCOUNT AUTHORIZATION** (this mode of payment may not be available at all receiving Offices)The RO/ **US** ☐ is hereby authorized to charge the total fees indicated above to my deposit account.☒ (this check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) i.
hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my
deposit account.☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International
Bureau of WIPO to my deposit account.**06-1050****14 June 2000**

Deposit Account No.

Date (day/month/year)

Signature

PATENT COOPERATION TREATY

FAL
06M

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

FISH & RICHARDSON P.C.
Attn. LICHAUCO, Faustino A.
225 Franklin Street
Boston, Massachusetts 02110-2804
UNITED STATES OF AMERICA

RECEIVED

MAR 26 2001

FISH & RICHARDSON, P.C.
BOSTON OFFICE

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference

11871-004W01

Date of mailing
(day/month/year)

26/03/2001

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/US 00/16361

International filing date
(day/month/year)

14/06/2000

Applicant

NORTEL NETWORKS LTD.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

Docketed By Practice Systems

Prop to Report 5/26/01

Initials: OAS
Record:

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

Docketed By Billing Secretary

Due Date:

Deadline:

Initials:

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Claude Berthon

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the International application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.